

Auburn  
McKenney-Harrison Elementary School  
PM10 Monitoring Special Study

October 10, 2001  
To  
October 31, 2002

Prepared by  
Ambient Monitoring Section  
Office of Air Quality  
IDEM

August 2003

# **PM10 Special Purpose Monitoring Site Auburn, IN**

## **Introduction**

The Office of Air Quality (OAQ) of the Indiana Department of Environmental Management (IDEM) received complaints from citizens regarding the particulate emissions from the Auburn Foundry, and the air quality in the surrounding vicinity. In an effort to determine if levels of particles in the air exceed federal health standards for coarse particulates (PM10), IDEM established a PM10 (particulate matter less than 10 microns in size) monitor downwind from the foundry. The monitor was located on the roof of McKenney-Harrison Elementary School and collected data from October 10, 2001 to October 31, 2002.

This report summarizes the results of the recent PM10 monitoring study conducted at McKenney-Harrison Elementary School, which served to determine if the ambient levels of PM10 were in compliance with the National Ambient Air Quality Standards (NAAQS) for PM10, set forth by the United States Environmental Protection Agency (USEPA).

## **Project Plan**

In order to determine if compliance with the NAAQS was evident, a PM10 monitor was placed on the rooftop of McKenney-Harrison Elementary School. A meteorological station located east of Auburn at SDI Butler Co. was used to measure wind speed (WS) and wind direction (WD). These data were shared with IDEM to facilitate the study. The monitoring period established at the beginning of the study was one year. This time period would allow for the collection of air quality data through all seasonal variations.

## **National Ambient Air Quality Standards**

The USEPA has established NAAQS for six criteria pollutants. For each pollutant, a primary and secondary standard is set. The primary NAAQS are set to protect the public health of the population, including the health of sensitive populations such as asthmatics, children, and the elderly. The secondary NAAQS are established to protect the public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings. The level of primary and secondary NAAQS for PM10 are set to the same value. For PM10, a short term (24 hour average), and a long term (annual average) time period is set for each of these NAAQS. The level of the short term NAAQS is 150 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ), and the level of the long term NAAQS is 50  $\mu\text{g}/\text{m}^3$ .

The short term standard is met when the yearly average number of exceedances for a three-year period is less than or equal to one. The long term standard is met when the average of the three-year averages is less than or equal to 50 $\mu\text{g}/\text{m}^3$ . For the purposes of

this study, the number of exceedances allowed would be 1, and the average over the sampling period should be less than or equal to 50.

### **Particulate Sources**

Attachment 1 is a list of the sources reporting emissions of PM10 for 2001-2002 in DeKalb County. The largest emitter of PM10 is the Auburn Foundry with estimated emissions of 152 tons/year.

### **Site Location**

A continuous PM10 sampling unit was installed on the roof of McKenney-Harrison Elementary School, on the west wing. The sample inlet was approximately 1400 ft. east of the Auburn Foundry property line. The Auburn Foundry building was located between 245° to 293° from the monitoring site, and the property of the facility spanned was located between 226° to 300° (approximately). Attachment 2 shows a regional county map, and Attachment 3 shows the location of the monitoring site (McKenney-Harrison), as well as the pollution source (Auburn Foundry), in the city of Auburn. The UTM's of the site are 662.120 E and 458.072 N. The site is identified using the AIRS (Aerometric Information Retrieval System) site number 18-033-0001.

### **Sampling Period**

The PM10 monitor began collecting data on October 10, 2001 and continued until October 31, 2002. The meteorological data (WS and WD) was provided by SDI Butler's continuous monitoring program, and was sustained throughout this PM10 sampling study at McKenney-Harrison School.

### **Equipment**

A Rupperecht and Patashnick (R&P) model TEOM 1400a was used to collect PM10 values continuously. The 1400a incorporates a Tapered Element Oscillating Microbalance to measure particulate loading. Ambient air is drawn from atop the shelter into the unit through a size selective inlet, which allows only particulate matter less than 10 microns in size to pass through. A down-tube delivers the air containing the particulate to the monitor inside the shelter. A filter is placed atop a tapered glass rod, which oscillates between 150 and 400 megahertz. As more particulate is deposited on the filter, the oscillation frequency of the rod changes proportionately to the amount of the particulate load. The electronics of the monitor measures the difference in oscillation and calculates the PM10 concentration.

### **Data Collection**

Every hour the central data system of the Air Monitoring Branch, located in Indianapolis, polled the Auburn site and retrieved the data recorded for the previous hour. The hourly values were reviewed each day to determine the monitor operation, and the concentrations being collected. The data were compiled in a monthly summary and

reviewed by the branch staff for validity, completeness, and compliance with the NAAQS for PM10 concentrations.

## **Data Return**

For the PM10 sampling period from October 10, 2001 until October 31, 2002 a total of 9288 hours of valid data were possible. 8425 hours of valid data were collected for a valid data return of 90.9%.

A few large blocks of invalid data readings came as a result of power failure and machine malfunction. 312 hours of data were lost in June 2002, 233 hours in April 2002, and 175 hours in December 2001, due to machine malfunction. 92 hours of data were lost in July 2002, due to power failure. The remainder of invalid data readings consisted of one to three hours every few weeks as staff performed site checks, filter changes, or quality assurance activities.

SDI Butler's meteorological program provided quality valid data return. From a possible 9288 hours available during this time, 8735 hours of valid WS data were collected, for a 94.1% valid data return. For WD, 8559 hours were collected resulting in 92.2% valid data return. In April 2002, 266 hours of WS data were lost because of power failure, and 113 hours were lost in May 2002 because of machine malfunction. In November 2001, 107 hours of WD data were lost because of machine malfunction, and in April 2002, 268 hours were lost because of power failure.

Attachment 5 has a listing of the monthly Valid Data Return percentages.

## **Monitoring Results**

### Comparison to NAAQS

The concentrations of particulate matter measured in the air at this location in Auburn were compared to both the short term (24-hour) and long term (annual) NAAQS.

For comparison to the short term NAAQS of 150 ug/m<sup>3</sup>, the daily 24 hourly values recorded for a day are averaged to obtain a daily average. A valid daily average consists of a minimum of 18 hours or 75% of the hourly values from a day. The highest daily average recorded during the study was 110 ug/m<sup>3</sup> on 5/9/02. The second highest was 103 ug/m<sup>3</sup> on 4/25/02, and the third highest was 95 ug/m<sup>3</sup> on 10/26/01. A listing of all the daily averages is in Attachment 6. The values are charted in Attachment 7.

The long term (annual) NAAQS is calculated by averaging the four quarterly averages of concentrations collected. To attain the standard, the average must be below 50 ug/m<sup>3</sup>. Since the sampling period for this study was not a calendar year, the averages were calculated in two ways. Quarterly averages were calculated, and for the five different quarters in which the site was operational. Then, the average of the quarters was calculated to obtain an average for the sample period. The data are as follows:

Quarter	Quarterly Averages (ug/m <sup>3</sup> )
4 qtr. 2001	17
1 qtr 2002	24
2 qtr 2002	32
3 qtr 2002	32
4 qtr 2002	26
<b>Sampling Period Average</b>	<b>26 ug/m<sup>3</sup></b>

Calculating an average from all the values for the entire period produces an average of 26 ug/m<sup>3</sup>. Regardless of which method is used to calculate the average for the sampling period, the average is approximately one-half of the long term standard.

#### Comparison to Other Cities

The concentrations obtained from the Auburn monitoring location were compared to the values collected at representative samplers in other cities throughout Indiana for this time period. Most PM<sub>10</sub> monitors are located in populated or downtown business areas. Two of the comparison sites are located in industrial settings. One site is located in Gary and one site in Indianapolis. The annual averages for Indiana's major cities in 2001 and 2002 range from 14ug/m<sup>3</sup> to 32ug/m<sup>3</sup>. All are well below the annual NAAQS. The average of 26 ug/m<sup>3</sup> reported from Auburn is less than the industrialized Gary site, and comparable to cities such as Terre Haute, Jeffersonville, and Evansville.

A comparison of the maximum 24-hour values obtained in 2001 and 2002 from these same sites indicates that the Gary industrialized site exceeded the 24-hour NAAQS of 150 ug/m<sup>3</sup> with a reported value of 192 ug/m<sup>3</sup>. A 24-hour concentration of 110 ug/m<sup>3</sup> was Auburn's highest value. The city of Gary was the only site that reported a higher 24-hour PM<sub>10</sub> value in 2001-2002. Every other PM<sub>10</sub> site in Indiana had maximum values between 21 ug/m<sup>3</sup> and 63 ug/m<sup>3</sup> during 2001-2002.

City comparisons for annual averages can be found in attachment 8, and 24-hour comparisons can be found in Attachment 9.

IDEM conducted a nearly identical study for 1-year during 2000-2001 at a foundry in the city of Columbus. The results of the Columbus study were fairly similar to those found in the Auburn study, with Auburn posting generally higher values. Using an identical sampling method, the average PM<sub>10</sub> concentration for the sampling period in Columbus was 25.9 ug/m<sup>3</sup>, compared to 26.0 ug/m<sup>3</sup> in Auburn. In both cases, the annual health standard (50 ug/m<sup>3</sup>) was not exceeded. Additionally, the maximum 24-hour concentration in Columbus was 75 ug/m<sup>3</sup>, compared to 110 ug/m<sup>3</sup> during the Auburn study. Although Auburn posted a significantly higher 24-hour value, the fact remains that the 24-hour health standard (150 ug/m<sup>3</sup>) was not exceeded. Finally, average hourly concentrations, which are used to determine the average 24-hour values, were also

compared. The maximum hourly concentration for the Columbus study was 204 ug/m<sup>3</sup>, while Auburn posted a maximum hourly average of 330 ug/m<sup>3</sup>. For the top ten days of maximum hourly concentrations recorded in each city, Columbus averaged 155 ug/m<sup>3</sup>, compared to 290 ug/m<sup>3</sup> for Auburn. These data show that Auburn posted significantly higher maximum hourly averages during a one-year study. Factors such as factory production, wind direction, and wind speed are some of the attributes to these values. For both cities, the 24-hour average values, which are derived from these maximum hourly averages, are well within the NAAQS for PM<sub>10</sub> emissions.

#### Comparison to Wind Direction

One advantage of collecting PM<sub>10</sub> data continuously, as opposed to collecting a filter-based 24-hour integrated sample, is the ability to track the particulate concentrations as they rise and fall during the day. The values tend to fluctuate as a result of the wind direction at the site, and the differing activities around the site. A table of WD compared to the different concentrations of PM<sub>10</sub> is shown in Attachment 10 and the pollution rose of this data is in Attachment 11. The predominant wind directions for the sampling period was between 237° (WSW) and 303° (WNW) accounting for 36.7% of the time.

The highest hourly concentration of PM<sub>10</sub> monitored at the Auburn site during the sampling period was 330 ug/m<sup>3</sup>. A listing of the highest hourly PM<sub>10</sub> concentrations is in Attachment 12.

The number of hours for which both PM<sub>10</sub> and WD were collected was 7853. As indicated by the pollution rose, the majority of the higher PM<sub>10</sub> concentrations occurred when the winds were from a westerly direction. PM<sub>10</sub> hourly averages of 50 ug/m<sup>3</sup> or greater were reported during 871 hours or 11.2% of the monitoring period. Of these hours, 815 (93.6%) were recorded when the WD was between 192° (SSW) and 348° (NNW). Essentially all concentrations greater than 100ug/m<sup>3</sup> were recorded when the WD was between 237° (WSW) and 303° (NNW). There appeared to be no seasonal distribution as the high values with the westerly winds occurred throughout the entire study.

Attachment 13 lists the 30 highest 24-hour concentrations recorded in this study. The number of hours that the WD was from each direction is also listed. These data show that the wind came from a westerly direction nearly 95% of the time that the highest concentrations were recorded.

Also analyzed were the days of high and low concentrations, in comparison to melt and truckloads of sand moving from the foundry to the landfill. MELT is the total amount of material melted (in lbs.) in all furnaces; and generally the more material melted the more sand handling, grinding, etc. would occur. The amount of waste sand hauled to the landfill and the number of truckloads is an indicator of potential fugitive PM and PM<sub>10</sub> emissions. Wind coming from the Auburn Foundry toward the monitor is defined as 270° plus or minus 30° (240° to 300°).

Attachments 15 and 16 reflect these comparisons, and use 75 ug/m<sup>3</sup> or higher to designate a “high” day and less than 10 ug/m<sup>3</sup> to designate a “low” day.

In summary, most of the “high days” occurred when the wind was toward the monitor most of the day with high production and waste sand handling. Most of the “low days” occurred when the wind was not in the direction of the monitor or there was no production. However, there were some days with normal production and waste hauling and the wind toward the monitor for several hours when the PM10 concentration was below 10.

## **Conclusions**

Neither the short term (24-hour) health standard nor the long term (annual) health standard was exceeded during the sampling period. These are levels that have been established by the USEPA as protective of the public health over these time periods. Both daily and annual average, along with maximum values were well within the federal standards.

With the exception of the city of Gary, which is located in a highly industrialized area, the annual average and the maximum 24-hour concentration reported from the Auburn site are among the higher values obtained from different sites across Indiana. The long term (annual) values obtained in Auburn are comparable to those monitored at other industrial locations throughout Indiana. However, the short term (24-hour) values in Auburn were surpassed only by the Gary industrialized site in 2001-2002. The highest PM10 concentrations were recorded when the wind came from the directions between 237° (WSW) and 303° (WNW). Since the Auburn Foundry is the largest source of PM10 in the area, and is located between 245° to 293°, the high concentrations of PM10 recorded at the monitoring site are probably due to the emissions from this facility. The data clearly show that PM10 levels were higher when the wind blew from the direction of the Auburn Foundry.

IDEM also analyzed the PM10 concentrations on the days of the monitoring period when IDEM staff or neighbors indicated that smoke or dust emissions from the Auburn Foundry were higher than normal. Attachment 14 shows a list of dates and PM10 concentrations when individuals had complained about emissions. It appears that visible emissions from the plant are not a good indicator of PM10 emissions. This could be due to other forms of dust and particulate that are larger than 10 micrograms, which are not analyzed during PM10 sampling, but are also highly visible during stack emissions.

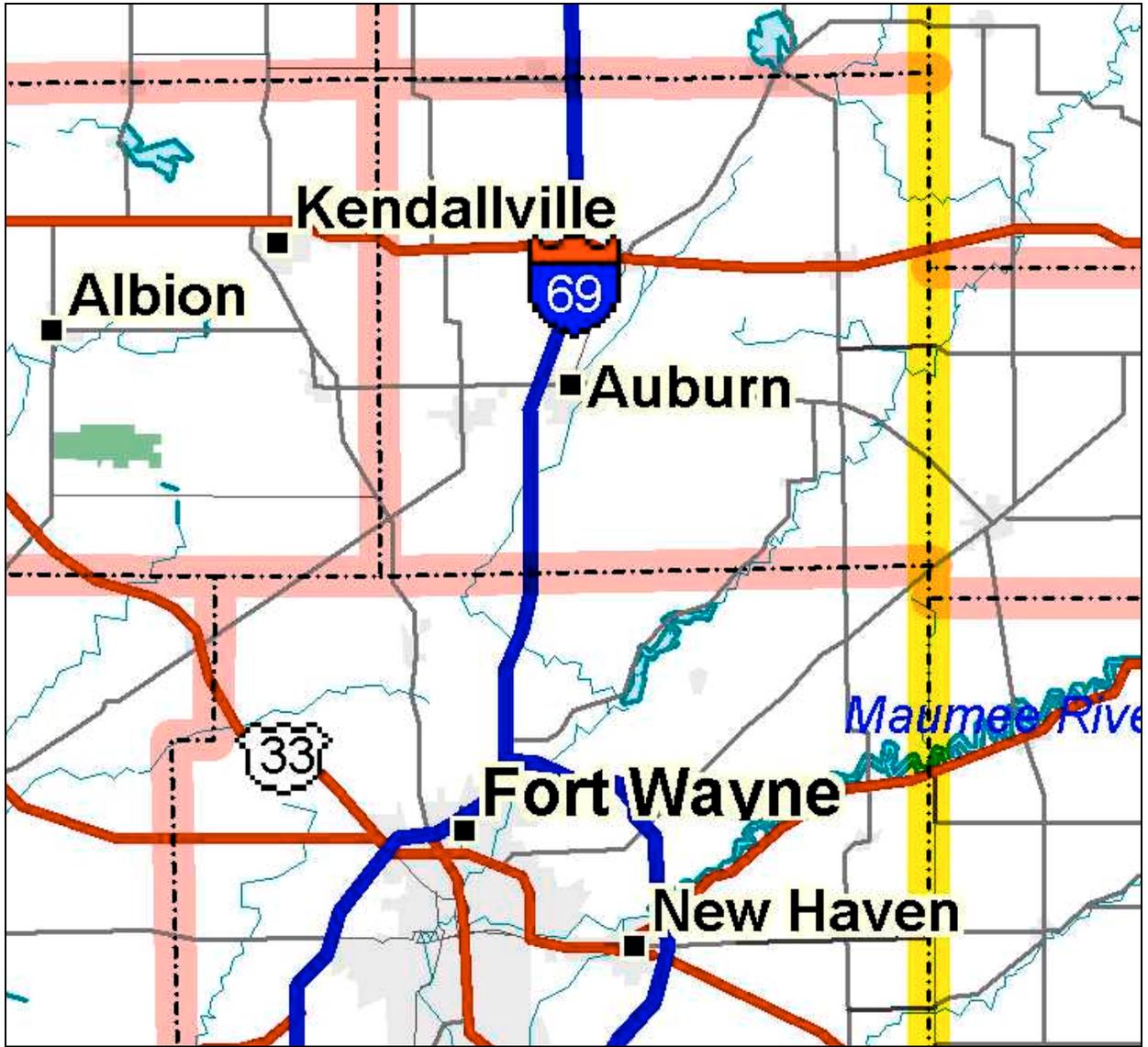


Attachment 1

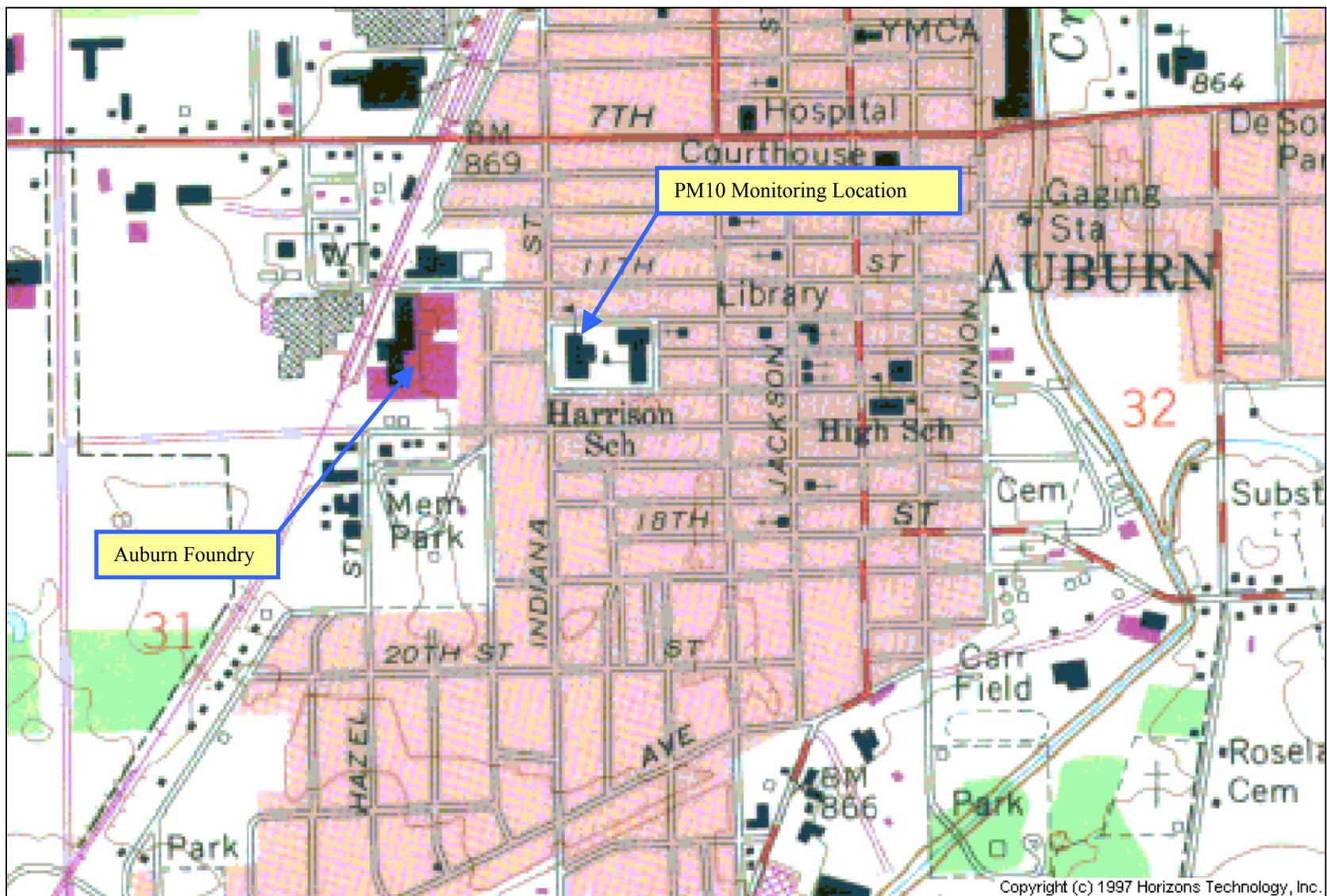
Auburn - McKenney-Harrison School Special Study  
PM 10 Emissions DeKalb County

<b>CNTY CODE</b>	<b>PLANT ID</b>	<b>NAME</b>	<b>STREET</b>	<b>CITY</b>	<b>EST EMISSIONS (tons/yr)</b>	<b>UTM NORTHING</b>	<b>UTM EASTING</b>
033	00002	Auburn Foundry, Inc. Plant 1	at 635 W. 11th St.	Auburn	152	4580.808	661.896
033	00043	STEEL DYNAMICS, INC.	4500 County Road 59	Butler	125	4581.700	673.900
033	00047	FOAMEX L.P.	2211 Wayne St	Auburn	21	4468.067	664.437
033	00042	AUBURN FOUNDRY	1537 W Auburn Dr	Auburn	9	4579.135	660.190
033	00027	VULCRAFT	6610 Co. Rd. 60	St. Joe	2	4575.400	678.100
033	00072	NEW MILLENNIUM BUILDING SYSTEMS, LLC	4182 County Road 59	Butler	1	4582.000	675.000

Attachment 2  
Auburn Special Study  
Regional Map



**Attachment 3**  
**McKenney/Harrison School and Auburn Foundry Location**



**Attachment 4**

**Auburn - Special Study  
PM 10 Calibration and Audit Results**

		<b>High Flow</b>	<b>Low Flow</b>
<b>Date</b>	<b>Audit/Calibration</b>	Limit = +/- 10%	Limit = +/- 0.2 LPM
10/04/01	Calibration	-1.8%	0.01
11/07/01	Audit	-2.4%	-0.11
12/05/01	Audit	0.3%	-0.04
12/11/01	Audit	1.5%	0.02
01/28/02	Audit	1.4%	-0.08
02/28/02	Audit	1.6%	-0.20
04/23/02	Audit	4.9%	0.01
06/18/02	Audit	-0.6%	0.12
07/17/02	Audit	3.9%	-0.06
08/13/02	Audit	2.3%	-0.06
09/11/02	Audit	0.8%	-0.10
10/08/02	Audit	3.3%	0.05
11/01/02	Close Out Audit	0.9%	-0.01

**Attachment 5**

**Auburn - Special Study  
Valid Data Return (VDR)**

<b>2000</b>	<b>PM10</b>				<b>WS/WD</b>	<b>WS</b>		<b>WD</b>	
	Total Hours Possible	Valid Hours	VDR	Valid Days*	Total Hours Possible	Valid Hours	VDR	Valid Hours	VDR
October	528	528	100.0%	22	528	527	99.8%	526	99.6%
November	720	714	99.1%	30	720	711	98.8%	612	85.0%
December	744	599	80.5%	24	744	739	99.3%	739	99.3%
<b>2001</b>									
January	744	735	98.8%	31	744	727	97.7%	710	95.4%
February	672	666	99.1%	28	672	592	88.1%	592	88.1%
March	744	734	98.7%	30	744	743	99.9%	573	77.0%
April	720	487	67.6%	20	720	453	62.9%	436	60.6%
May	744	740	99.5%	31	744	632	84.9%	711	95.6%
June	720	408	56.7%	16	720	715	99.3%	715	99.3%
July	744	652	87.6%	27	744	742	99.7%	742	99.7%
August	744	703	94.5%	28	744	743	99.9%	743	99.9%
September	720	716	99.4%	30	720	719	99.9%	719	99.9%
October	744	743	99.9%	31	744	692	93.0%	741	99.6%
<b>Total</b>	<b>9288</b>	<b>8425</b>	<b>90.9%</b>	<b>348</b>	<b>9288</b>	<b>8735</b>	<b>94.1%</b>	<b>8559</b>	<b>92.2%</b>

\* Days with >75% VDR (18 hr+)

**Attachment 6**  
**Auburn - McKenney Harrison School**  
**PM10 24-Hour Concentrations**

Units = ug/m3

DAY	2001			2002									
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
1		32	7	17	44	24		16	71	66		29	44
2		15	9	25	11	13		22	35	67	25	40	57
3		22	11	38	20	24		23	21	85	26	39	31
4		16	12	26	12	32		16	48	56	45	27	41
5		13		20	39	31		30		19	24	18	15
6		24		12	16	29		23		23	14	29	17
7		26		15	39	21		27		25	12	39	21
8		12		13	29	23		8		43	18	47	23
9		8		22	16	22		110		23	24	59	43
10	19	11		31	12	21		81		15	44	76	41
11	8	9		46	8	12	19	15		15	58	9	36
12	11	14	20	12	52	20	22	10		19	43	20	24
13	15	21	32	8	15	42	13	12		29	28	34	7
14	9	25	8	18	12	22	18	36		37	12	46	17
15	32	25	10	56	59	28	28	21		41	22	31	26
16	6	21	9	13	12	9	26	36		48	34	22	14
17	19	10	6	76	8	12	33	6		82	23	28	20
18	13	17	25	26	13	26	28	9	25	69	18	34	17
19	20	11	22	17	15	17	46	10	32	50	29	28	12
20	22	7	64	14	13	17	8	10	44	33	17	10	13
21	30	7	26	40	36	16	8	12	52	36		21	15
22	14	8	12	14	9	92	11	22	45	41		16	21
23	22	14	9	14	11	55	21	44	65	18	19	22	11
24	15	9	11	18	10	16	20	45	65	15	23	28	10
25	62	7	10	19	31		103	15	58	24	21	23	12
26	95	8	11	11	29	24	44	10	42	43	24	30	16
27	6	12	11	10	81	27	21	22	40	29	28	30	13
28	11	9	14	21	21	21	12	25	19		21	41	11
29	34	4	14	24		17	51	28	27		25	42	10
30	17	6	15	5		12	35	37	43		31	36	14
31	27		16			18		89			24		25

Quarterly Averages

17.3

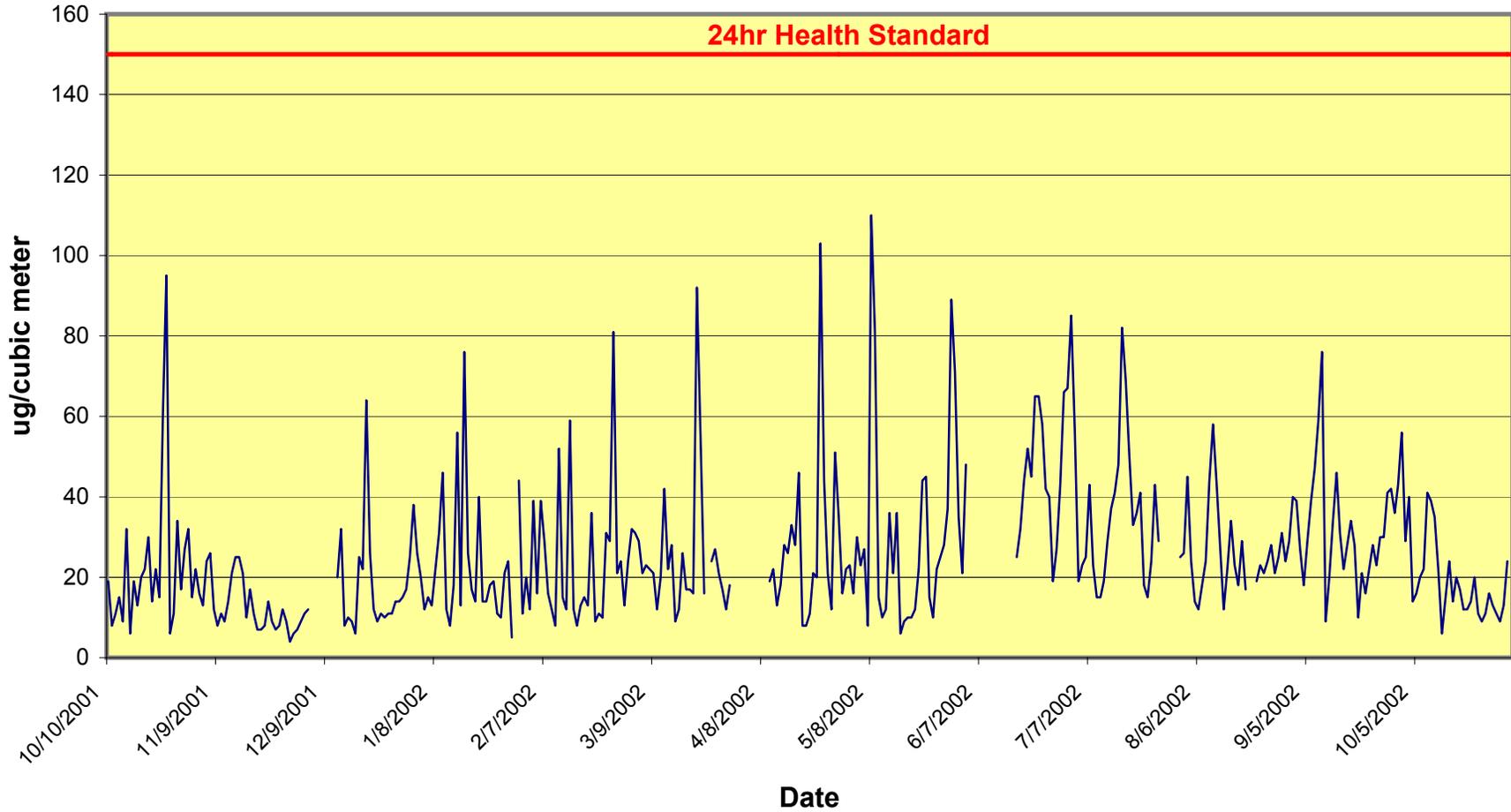
23.8

31.9

32.2

26.3

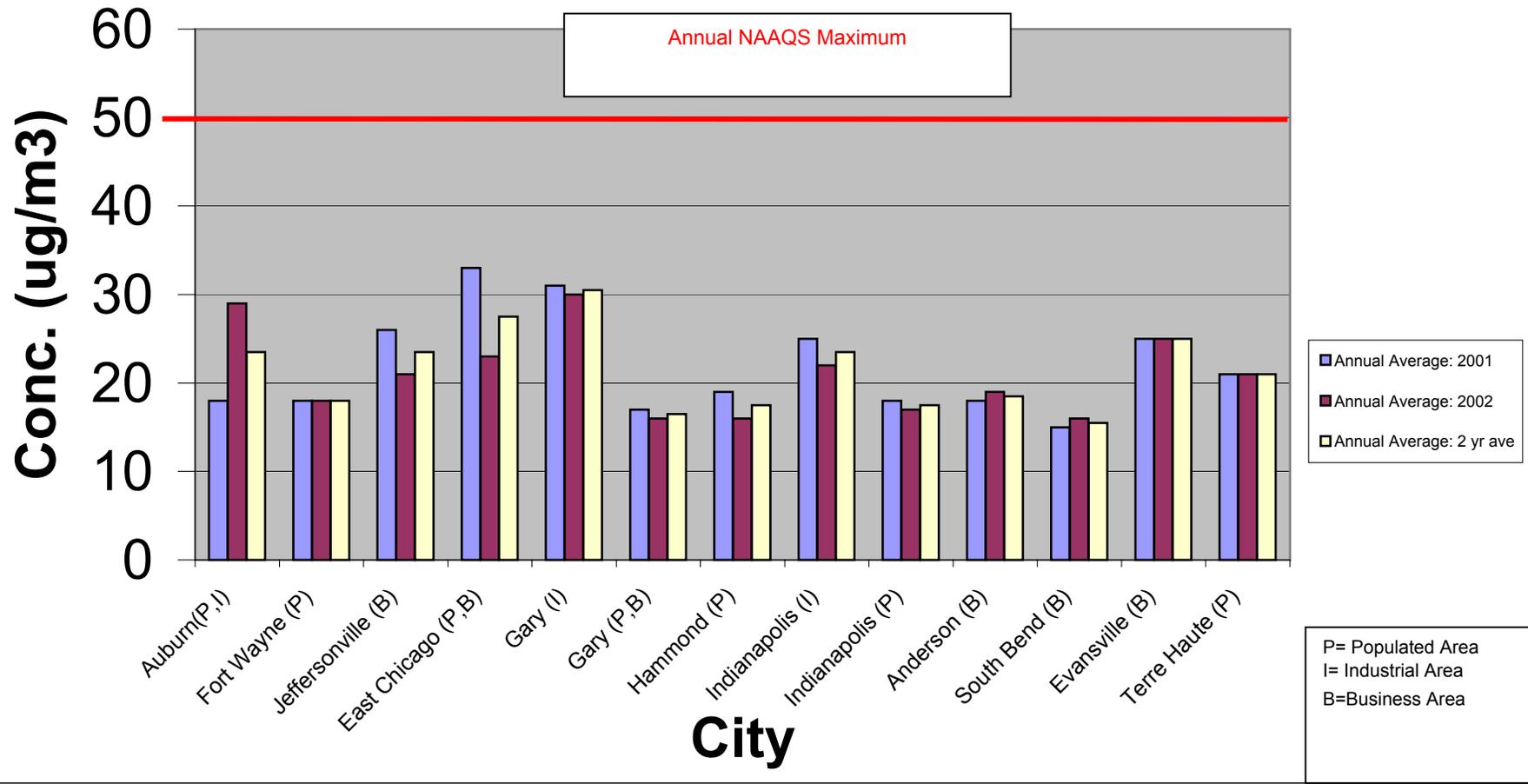
Attachment 7  
Auburn - Special Study  
PM10 24-hour Average Concentrations



# Attachment 8

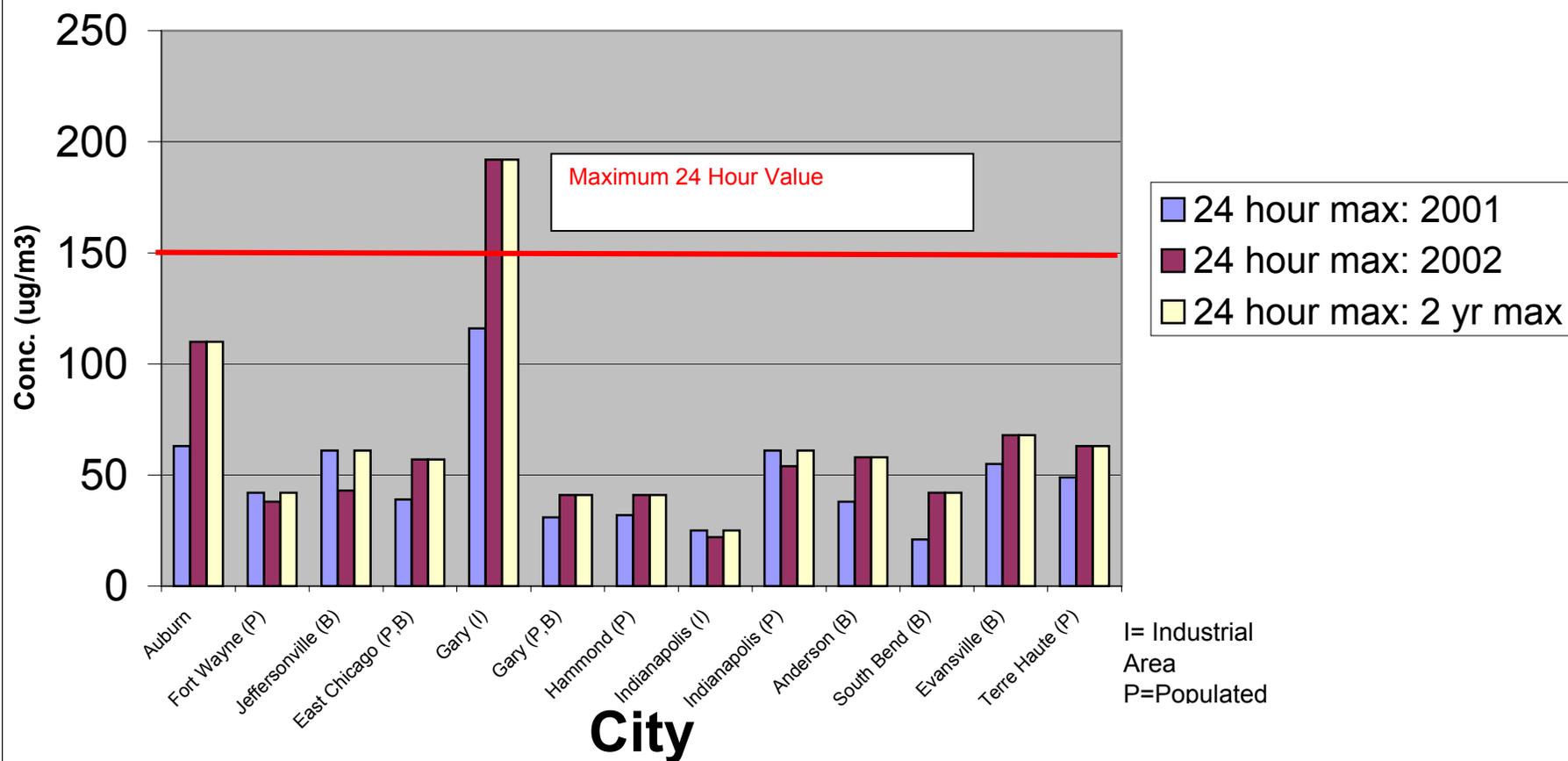
## Auburn Special Study

### Comparison of Annual Values



### Attachment 9

# Auburn Special Study Comparison of 24-Hour Maxs



Attachment 10  
**Auburn - Special Study**  
**Frequency Distribution (Concentration vs. Wind Direction)**

Percentage of total period hours for each concentration category vs wind direction

Concentration Category (ug/m3)	Wind Direction (Degrees)																	Freq per Conc Category
	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	
		349-11	12-33	35-56	57-78	79-101	102-123	124-146	147-168	169-191	192-213	214-236	237-258	259-281	282-303	304-326	327-348	
0-9	0	0.89	0.8	0.4	0.31	0.98	0.67	0.87	0.57	0.87	0.82	1.64	2.03	0.52	1.27	1.85	1.87	16.43
10-19	0	0.68	1.14	1	0.7	2.25	1.71	1.98	2.05	2.4	3.29	3.37	5.02	3.79	2.62	2.34	1.57	35.99
20-29	0	0.52	0.49	0.25	0.25	1.65	1.12	1.29	0.99	1.79	1.98	1.64	2.11	1.82	1.55	1.18	0.64	19.34
30-39	0	0.24	0.11	0.24	0.2	0.67	0.54	0.66	0.62	1.15	1.18	1.12	1.27	1.2	1.03	0.63	0.31	11.24
40-49	0	0.14	0.1	0.02	0.03	0.21	0.22	0.26	0.24	0.4	0.48	0.73	0.71	1.4	0.75	0.34	0.16	5.91
50-99	0	0.06	0.02	0.02	0.01	0	0.06	0.15	0.05	0.22	0.39	0.64	1.37	3.19	1.88	0.34	0.24	8.81
100-149	0	0	0	0	0	0	0	0	0	0	0	0	0.18	0.78	0.67	0.01	0	1.65
>=150	0	0	0	0	0	0	0	0	0	0	0	0	0	0.47	0.16	0	0	0.63
<b>Percentage of Time per Direction</b>	<b>0.00%</b>	<b>2.54%</b>	<b>2.68%</b>	<b>1.96%</b>	<b>1.52%</b>	<b>5.88%</b>	<b>4.33%</b>	<b>5.24%</b>	<b>4.53%</b>	<b>6.87%</b>	<b>8.17%</b>	<b>9.16%</b>	<b>12.72%</b>	<b>13.17%</b>	<b>9.95%</b>	<b>6.72%</b>	<b>4.82%</b>	<b>100%</b>

Number of hours for each concentration category vs wind direction

Concentration Category (ug/m3)	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	# Hours per Conc Category
		349-11	12-33	35-56	57-78	79-101	102-123	124-146	147-168	169-191	192-213	214-236	237-258	259-281	282-303	304-326	327-348	
0-9	0	70	63	31	24	77	53	68	45	68	64	129	159	41	100	145	147	1290
10-19	0	53	90	79	55	177	134	155	161	188	258	265	394	298	206	184	123	2826
20-29	0	41	38	20	20	130	88	101	78	141	155	129	166	143	122	93	50	1519
30-39	0	19	9	19	16	53	42	52	49	90	93	88	100	94	81	49	24	883
40-49	0	11	8	2	2	16	17	20	19	31	38	57	56	110	59	27	13	464
50-99	0	5	2	2	1	8	5	12	4	17	31	50	108	251	148	27	19	692
100-149	0	0	0	0	0	0	0	0	0	0	0	0	13	61	53	1	0	130
>=150	0	0	0	0	0	0	0	0	0	0	0	0	0	37	13	0	0	49
<b># Hours per Wind Direction</b>	<b>0</b>	<b>199</b>	<b>209</b>	<b>152</b>	<b>118</b>	<b>460</b>	<b>339</b>	<b>409</b>	<b>355</b>	<b>536</b>	<b>639</b>	<b>718</b>	<b>996</b>	<b>1034</b>	<b>780</b>	<b>525</b>	<b>376</b>	<b>7853</b>

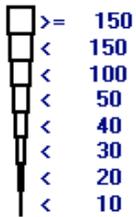
# Attachment 11

## Auburn – Special Study

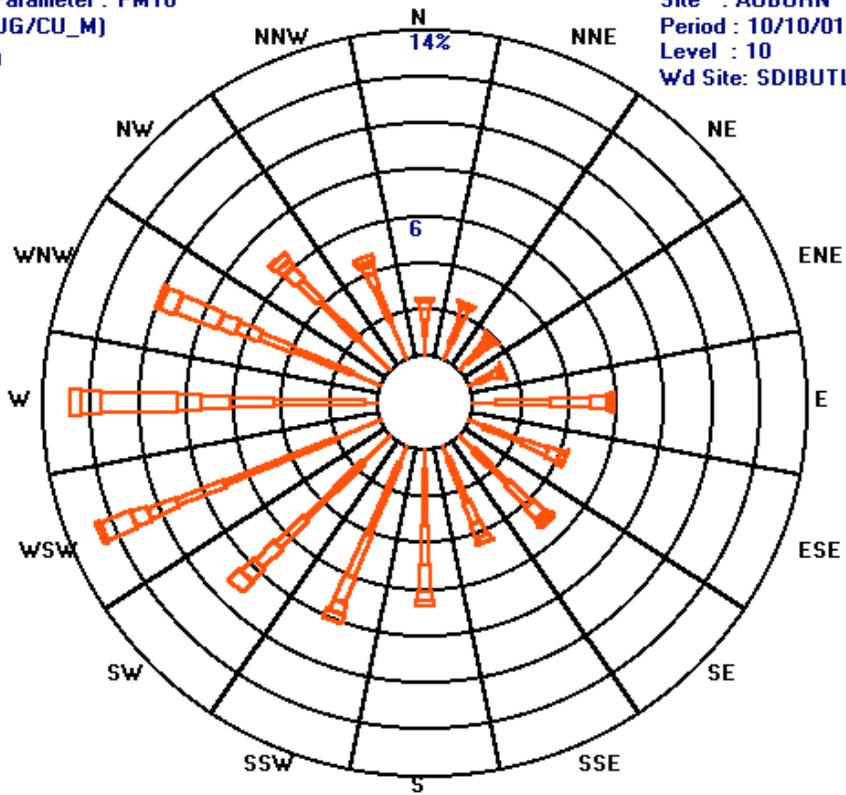
### Frequency Distribution Rose

#### PM10 Concentration Categories Vs Wind Direction

Logger : 41 Parameter : PM10  
 Class Limits (UG/CU\_M)



Site : AUBURN  
 Period : 10/10/01-10/31/02  
 Level : 10  
 Wd Site: SDIBUTLE



**Attachment 12**

<b>Auburn Foundry Special Study High PM 10 Conc. vs. WD</b>				
<b>Rank</b>	<b>PM 10 Hourly Average (ug/m3)</b>	<b>WD Hourly Average (degree)</b>	<b>Date</b>	<b>Hour</b>
1	330	281	05/31/2002	12
2	326	266	05/09/2002	20
3	310	269	04/25/2002	13
4	300	267	05/09/2002	19
5	295	274	04/25/2002	14
6	282	266	05/09/2002	18
7	280	267	05/31/2002	9
8	272	266	05/09/2002	17
9	264	270	10/04/2002	21
10	243	273	04/25/2002	15
11	241	274	05/31/2002	10
12	237	262	04/25/2002	12
13	225	294	04/30/2002	15
14	220	267	10/26/2001	11
15	218	270	05/10/2002	2
16	211	260	04/25/2002	11
17	203	287	09/10/2002	15
18	200	270	05/10/2002	4
19	195	265	06/04/2002	12
20	194	265	05/09/2002	21
21	193	276	06/27/2002	11
22	188	292	03/22/2002	18
23	188	276	06/01/2002	14
24	187	273	05/31/2002	11
25	187	296	06/01/2002	16
26	180	286	02/12/2002	19
27	178	262	10/26/2001	4
28	174	N/A	04/19/2002	3
29	173	283	09/10/2002	14
30	170	265	05/10/2002	5
31	168	273	06/01/2002	15
32	165	263	10/26/2001	0
33	165	280	02/15/2002	13
34	164	263	06/26/2002	16
35	162	259	06/21/2002	8
36	161	287	03/22/2002	12
37	161	278	09/10/2002	13
38	160	271	10/26/2001	2
39	160	264	10/26/2001	8
40	160	263	05/09/2002	12
41	158	279	07/04/2002	3
42	156	288	01/17/2002	21
43	156	272	05/09/2002	14

44	156	259	07/17/2002	11
45	154	297	03/22/2002	16
46	153	286	03/22/2002	10
47	153	276	03/23/2002	15
48	151	266	10/26/2001	10
49	151	289	01/17/2002	0
50	151	286	02/27/2002	20
51	150	287	02/27/2002	15
52	149	265	10/26/2001	3
53	149	289	02/26/2002	15
54	148	292	02/12/2002	18
55	147	266	10/26/2001	1
56	147	289	02/15/2002	17
57	147	265	05/10/2002	7
58	146	273	04/25/2002	16
59	146	275	05/09/2002	13
60	146	255	07/26/2002	11
61	145	273	07/17/2002	16
62	142	288	02/26/2002	16
63	142	286	02/27/2002	14
64	142	284	03/13/2002	17
65	142	259	04/25/2002	9
66	141	261	10/26/2001	5
67	141	286	03/22/2002	9
68	140	282	02/27/2002	11
69	140	288	02/27/2002	21
70	140	289	03/22/2002	13
71	140	262	05/10/2002	6
72	139	262	10/26/2001	9
73	138	286	02/05/2002	14
74	137	290	01/17/2002	22
75	137	299	03/22/2002	15
76	136	262	06/04/2002	11
77	135	263	10/25/2001	23
78	134	291	02/27/2002	16
79	134	276	06/04/2002	13
80	134	289	09/10/2002	12
81	133	289	02/12/2002	11
82	133	276	02/15/2002	12
83	133	275	03/23/2002	10
84	133	280	04/29/2002	16
85	131	286	02/15/2002	14
86	131	277	03/23/2002	11
87	130	277	03/23/2002	16
88	130	266	04/29/2002	15
89	129	286	02/15/2002	20
90	128	288	02/27/2002	17
91	128	286	03/15/2002	10
92	126	284	03/22/2002	11
93	125	285	02/27/2002	13
94	125	274	03/23/2002	13

95	125	274	07/16/2002	22
96	124	286	02/27/2002	18
97	124	292	03/22/2002	17
98	124	277	07/17/2002	12
99	123	269	01/15/2002	14
100	123	272	03/13/2002	19

Attachment 13

## Auburn - McKenney Harrison School Special Study Maximum 24-Hour Concentrations Vs Number of Hours per Wind Direction

Rank	24-hr Conc. ug/m3	Date	Wind Direction (Degrees)																	
			Invalid	Calm	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	WNW
			Hours		349-11	12-33	34-56	57-78	79-101	102-123	124-146	147-168	169-191	192-213	214-236	237-258	259-281	282-303	304-326	327-348
1	110	05/09/02	4						2	4					3	12				
2	103	04/25/02	9												2	9	4			
3	95	10/26/01														20	4			
4	92	03/22/02														7	17			
5	89	05/31/02												1	8	6	7	2		
6	85	07/03/02	1										1	2	2	10	6	2		
7	82	07/17/02													6	15	3			
8	81	02/27/02														12	12			
9	81	05/10/02														8	11	4	1	
10	76	01/17/02														2	17	5		
11	76	09/10/02														6	11	4	3	
12	71	06/01/02											1	3	3	10	5	2		
13	69	07/18/02											1	2	5	5	7	3	1	
14	67	07/02/02													3	7	9	4	1	
15	66	07/01/02												1	11	11	1			
16	65	06/23/02									6	1	7	3	2	3	2			
17	65	06/24/02									1	1	3	6	7	5	1			
18	64	12/20/01													4	17	3			
19	62	10/25/01													16	8				
20	59	02/15/02													10	6	8			
21	59	09/09/02				1		2								1	5	6	9	
22	58	06/25/02							2					2	3	9	3		1	
23	58	08/11/02											5	11	4	3	1			
24	56	01/15/02												6	4	14				
25	56	07/04/02													3	6	6	6	3	
26	56	10/02/02						1					2	1	4	12	2	1	1	
27	55	03/23/02													1	21	2			
28	52	02/12/02													3	7	10	3	1	
29	52	06/21/02						3	5	3				2	4	3	1	1	2	
30	51	04/29/02												4		2	8	10		

**Attachment 14**

<b>Auburn Foundry Special Study Date of Citizen Concern vs. 24-Hour Concentration</b>	
<b>Date</b>	<b>Concentration (ug/m3)</b>
January 17, 2002	76
February 19, 2002	15
March 1, 2002	24
March 8, 2002	23
March 16, 2002	9
March 28, 2002	21
April 26, 2002	44
April 29, 2002	51
May 6, 2002	23
June 5, 2002	30

\*National Ambient Air Quality Standard maximum = 150 ug/m3

**Attachment 15**

“LOW” DAYS

<u>DATE</u>	<u>ug/m3</u>	<u># hrs wind toward monitor</u>	<u>MELT</u>	<u>Tons sand to landfill and # of truckloads</u>
10-11-01	8	4	938,840	61/4
10-14-01	9	12	0	0
10-16-01	6	8	1,146,060	172/9
10-27-01	6	17	0	0
11-9-01	8	5 of 10	975,030	172/9
11-11-01	9	4	140,000	0
11-20-01	7	11	1,197,200	176/9
11-21-01	7	2	788,550	198/10
11-22-01	8	0	0	0
11-24-01	9	0	0	0
11-25-01	7	15	0	0
11-26-01	8	4	1,438,170	204/11
11-28-01	9	7	1,282,160	173/9
11-29-01	4	0	1,083,580	202/11
11-30-01	6	0	1,602,950	196/10
12-1-01	7	12	84,540	204/10
12-2-01	9	0	1,272,470	0
12-14-01	8	5	1,534,730	219/11
12-16-01	9	0	0	0
12-17-01	6	0	82,000	199/11
12-23-01	9	18	0	0
1-13-02	8	15	0	0

**Attachment 15 (Continued)**

**“LOW” DAYS**

<u>DATE</u>	<u>ug/m3</u>	<u># hrs wind toward monitor</u>	<u>MELT</u>	<u>Tons sand to landfill and # of truckloads</u>
1-30-02	5	0	1,355,040	179/10
1-31-02	4	0 of 9	1,497,110	168/9
2-11-02	8	8	1,541,710	247/13
2-17-02	8	1 of 17	0	19/1
2-22-02	9	2 of 13	1,505,620	324/17
3-16-02	9	0 of 7	1,538,860	259/13
3-25-02	7	4 of 11	1,933,350	146/9
4-20-02	8	no data	0	81/4
4-21-02	8	no data	0	0
5-8-02	8	0	1,668,430	197/11
5-17-02	6	0 of 14	1,787,740	350/20
5-18-02	9	3	1,309,470	0
9-11-02	9	1	1,812,980	341/20
10-13-02	7	8	0	0

**Attachment 16**

**“High” Days**

<u>DATE</u>	<u>ug/m3</u>	<u># hrs wind toward monitor</u>	<u>MELT</u>	<u>Tons sand to landfill and # of truckloads</u>
10-26-01	95	24	627,880	0
1-17-02	76	17	1,695,000	224/12
2-27-02	81	24	1,518,080	163/9
3-22-02	92	24	1,954,290	390/20
4-25-03	103	15 of 15	1,730,180	394/22
5-9-03	110	16 of 22	1,729,760	180/10
5-10-02	81	20	1,686,030	162/9
5-31-03	89	17	1,620,430	306/17
7-3-02	85	18 of 23	280,000	175/9
7-17-02	82	22	1,528,660	236/14
9-10-02	76	15	1,927,920	59/4